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A COLLECTION OF BIRD REMAINS FROM THE
PLIOCENE OF SAN DIEGO, CALIFORNIA

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A small collection of fossils from the San Diego Formation (Pliocene) constitutes the subject of this report. The material, collected over a period of some four years, by Mr. Joseph Arndt, was generously presented to me by the collector. With the exception of one bone, of which there were several duplicates, all specimens were placed in the Museum of Paleontology of the University of California at Berkeley. The single exception, a complete humerus of *Mancalla diegensis*, was sent to the United States National Museum in Washington.

During my later years of residence in Los Angeles several young men of San Diego, including Mr. Arndt, sent me bird material from the San Diego Formation and I finally recommended to Dr. Hildegard Howard of the Los Angeles County Museum that her institution take up some serious exploration there. This was done with most satisfactory results. A composite skeleton of *Mancalla* has been assembled and mounted at the Museum, and much additional material representing ten species of birds and a seal is now preserved at the Los Angeles Museum and at the University of California at Los Angeles.

MATERIAL

In Mr. Arndt's contribution there are forty-eight items that are recognizable as bird bones. Others are identifiable as ear bones of small ceta-

ceans, limb bones of a small pinniped, rib fragments, and numerous fish remains.

THE DEPOSIT

The San Diego Formation has been discussed in earlier publications (Howard, 1949; Miller and Howard, 1949). It may be stated here in brief that it represents a shallow-water marine accumulation in an enclosed embayment with sand bars at approximately tidal level and small islands that served as breeding grounds for sea birds or cliff dwellers.

ACKNOWLEDGMENTS

My sincere thanks are extended to Mr. Joseph Arndt for donation of the material, to Dr. Herbert Friedmann of the U. S. National Museum for the loan of a partial skeleton of *Phodilus badius*, to Dr. A. Wetmore for his most helpful examination of the type specimen of *Lechusa stirtoni*, and to Dr. Alden H. Miller for suggestions on preparation of the manuscript.

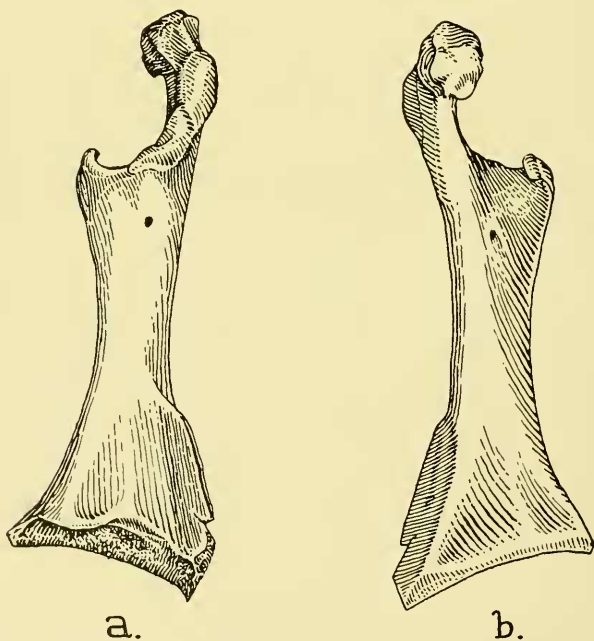


Figure 1. Type specimen of *Lechusa stirtoni*. A - Dorsal aspect. B - Ventral aspect. Approximately x 2. Drawings by Gene Christman.

LIST OF PLIOCENE BIRD BONES IN THE ARNDT CONTRIBUTION OF JUNE, 1955

Gavia concinna Wetmore. A single humerus, lacking only the head. The size is identical with a specimen figured by Brodkorb. The humerus figured by Howard is from a smaller bird that was later described by Brodkorb (1953) as *Gavia howardae*.

Gavia howardae Brodkorb. One tibia, lacking the distal condyles and the cnemial process. The total length must have been very slightly less than in males of *Gavia stellata* but the bone is "stockier," particularly where it widens out distally. The missing condyles must have supported a larger foot than is found in Recent specimens of *G. stellata*. Brodkorb states in his original description of *G. howardae*, based on the humerus, that the species is slightly smaller than *G. pacifica* or *G. stellata*.

Colymbus parvus Shufeldt. One tibiotarsus, proximal two-thirds. Howard (1949) speaks of the tibiotarsus of this species taken from the San Diego Formation as "similar to *Colymbus grisegena* or *C. auritus* in physical characters, but between the two in size with closest approach to *C. grisegena*." Our specimen is assigned with confidence to the species *C. parvus*. A specimen of the distal tibial condyles, very badly water worn, is likewise assigned, but with much less assurance. A complete coracoid only slightly smaller than that of *C. grisegena* seems certainly to be of the species *C. parvus*.

Colymbus sp. Dr. Howard reported a grebe smaller than *Colymbus parvus* from the San Diego beds and suggests that, were the material more complete, a heretofore unknown species would need to be described. The present collection contains also some imperfect bones of a small grebe. With continued collection from the area we should ultimately come to a fair understanding of this smaller species and a specific category could be designated with confidence.

Puffinus kanakoffi Howard. A single complete humerus represents the Procellariiformes in this collection. The bone is shorter by 3 mm. than that of a male of *P. opisthomelas* (19080 MVZ), but is actually thicker and broader in the shaft and through the distal condyles. The radial condyle is slightly heavier. Certain elusive differences in the head region are difficult to describe though they are apparent during direct comparison.

Phalacrocorax kennelli Howard. The type specimen is a coracoid (incomplete) from the San Diego Formation which "agrees in size with *P. pelagicus*" (Howard, 1949). The ulna is heretofore unknown. In this collection there is a complete ulna almost the exact length of that of *P. pelagicus*; hence it is assigned to the species *P. kennelli*. It is, however, a markedly more slender bone than that possessed by *P. pelagicus*, with smaller articu-

lations both proximal and distal. The internal cotyla is narrower than it is in either *P. pelagicus* or *P. penicillatus*. Likewise the external cotyla has a less pronounced hook on its distal extension than is found in either of the Recent species. The head of a right humerus is also assigned to this species though it is very slightly narrower than in *P. pelagicus*.

Brachyramphus (?) **pliocenus** Howard. This species, described by Howard (1949), was based upon a humerus lacking the distal end. Referred material included a complete ulna, the distal ends of two humeri, an incomplete cranium, and the articular end of a lower mandible.

We now have a perfect tarsometatarsus that comes from a bird of about the same size and familial relationship. Since there is no association of parts in the matrix of these beds, the first impulse would be to assign all of these parts to the same species. The tarsus, however, does not resemble that of *Brachyramphus* so much as it does others of the auklets. It is shorter and stouter than in *Synthliboramphus antiquus*, more slender than in *Ptychoramphus aleuticus*, and very closely resembles that of *Aethia pusilla* though very slightly stouter. I shall look forward to the recovery of further material that may give greater assurance to the generic assignment of *B. pliocenus*.

The tarsus (No. 45662, UC Mus. Paleo.) in question shows the following characters: length very slightly greater than in *Aethia pusilla* but stouter with broader head and foot; hypotarsus almost identical with that of *Aethia* and quite different from that of *Brachyramphus*; anterior face of head and shaft more as in *Brachyramphus* than in *Aethia*, however, in its being more excavated. The tarsus of *Aethia* is almost flat. The fossil is very similar to *Ptychoramphus*. It is much more slender although but slightly shorter. Its head is very similar, as is the hypotarsus also (4 ridges instead of 3). The excavation of the shaft is the same, but the inner condyle is set off a bit more gradually and is more distinct from the middle condyle and thus is strongly suggestive of *Sterna*, though the bone is that of an alcid.

I suggest reassignment of the species to *Ptychoramphus* or to a new genus.

Mancalla californiensis Lucas and **Mancalla diegensis** (L. Miller). I am continually astonished by the abundance of *Mancalla* remains that come from the San Diego Formation. There are 48 bones in the present shipment from Mr. Arndt that are recognizably avian. Of these 34 are assignable to the genus *Mancalla*. At the time of our joint publication (1949), Dr. Howard and I were fairly confident that two species of the genus were present, at least during part of the year, in Pliocene San Diego though the larger *M. californiensis* was in the decided minority. With the accumulation of more material through the intervening years, that confidence has reached the point of practical certainty. In this latest accession there are frag-

ments of humeri that even exceed in size Lucas' type from Los Angeles. No humerus of the larger form, however, is complete though three from the smaller form, *M. diegense*, are almost as perfect as recently prepared bones. One coracoid seems almost beyond question to have come from an immature individual.

Lechusa stirtoni, new genus and species. Stirton's Owl. Type specimen No. 45331 University of California Museum of Paleontology, a right coracoid from Lower-Middle Pliocene (San Diego Formation) San Diego, California, collected by Joseph F. Arndt. This specimen, a single almost perfect coracoid, represents a heretofore unknown genus and species of Barn Owl (Family Tytonidae). Size approximately equal to the corresponding bone in the male of *Tyto alba pratincola*, the living Barn Owl. Though shorter it is relatively heavier through the shaft. Head slightly larger and less globular (i.e., more angular). The triosseal canal is slightly larger. The procoracoid process is placed lower on the shaft and its axial border merges more gradually into the shaft below the fenestra. The shaft is relatively broader at the central zone. In all but one of eight Barn Owls examined, there is a tendency to form a notch on the axial border just above the sternal articulation. During life of the bird this represents a fenestra in the tough membrane that seals off the anterior end of the thoracic cavity. The one exception shows some evidence of juvenility. The fossil coracoid lacks this frail character and the margin is less sharp-edged in that region.

The proximal end of the coracoid is about equal in width to the average in Recent Barn Owls but the inter-muscular line on the ventral surface, instead of being almost rectilinear, is strongly curved outward as its proximal end.

Unfortunately the sterno-coracoidal margin is not entirely preserved, but the suggestion is that the pectoralis-tertius muscle is less strongly developed, with respect to the pectoralis secundus, than it is in the Recent specimens of *Tyto*.

Furthermore this intermuscular line is depressed almost to disappearance at a region between 5 and 6 mm. distal to its external extremity. The whole bone is depressed in this area in a manner difficult to define with accuracy yet it is evident to the eye. There is herein a resemblance to the Short-eared Owl, *Asio flammeus*.

When the bone is viewed from the proximal end, the sternal facet appears weaker than in *Tyto* and its dorsal margin falls away as the eye travels toward the external margin of the bone.

The dorsal aspect of the bone offers another one of those intangible yet observable differences. It suggests that the sterno-coracoidal process (unfortunately incomplete) began more abruptly to diverge from the shaft and it began at a point farther up the shaft, i.e., toward the coracoidal head.

The missing portion of the process may have been more extensive than at first suspected. In which case the pectoralis tertius muscle may not have been reduced as is suggested by the out-swing of the intermuscular line on the ventral surface of the bone. In other words this muscle may have been attached more to an expanded process and less to the shaft of the bone.

We thus appear to have a Pliocene owl that is definitely related to but differs from the Recent Barn Owls, a strongly marked group of almost world-wide distribution with but limited geographic modification.

The fossil was submitted to Dr. A. Wetmore of the Smithsonian Institution who very generously gave his reaction from which, by permission, I quote the following: “. . . it proves to belong in the Barn Owl family Tytonidae but represents what I consider to be a peculiar and unknown genus. . . . The lower end of the intermuscular line on the ventral (external) surface, however, shows a tendency toward what is found in typical owls. . . . A very interesting new genus and species of barn owl that shows some cross over toward the other family of owls.” I greatly appreciate Dr. Wetmore's friendly courtesy and find myself in full accord. I feel sure, however, that neither of us would place too great emphasis on the suggestion of “cross over” as a phylogenetic indicator particularly in the absence of a complete sterno-coracoidal process.

Although the Pliocene bird so strongly resembles the living forms of *Tyto*, it was not considered permissible to establish a new category within the family Tytonidae without examining the only other living genus assigned to that group, *Phodilus badius* of the Indian orient. This peculiar creature has been bandied about somewhat freely by three or four generations of systematists but has finally come to rest (it is hoped) in a monotypic sub-family of Tytonidae, the Phodilinae (Peters, 1940). After much delay and correspondence, the body skeleton of this species was obtained on loan from the U. S. National Museum. The most casual inspection of this material was sufficient to show that the Pliocene bird is not assignable to that sub-family. This is not the place to discuss the relationships of the genus *Phodilus* further than to say that its assignment to a distinct sub-family, if not even a full family, appears to be well founded.

The true Barn Owls are set off so positively from all the other Strigiformes that this Pliocene form seems to occupy a position of considerable importance. Certainly it is one of great interest.

The taxonomist who searches through the literature on the nocturnal birds of prey finds much confusion down through the years, in the application of generic and specific names. *Strix*, *Asio*, *Otus*, *Syrnium*, *Scops*, and *Athene* have all been pretty freely shuffled about or even reversed as generic and specific terms.

It seemed proper to this writer therefore to introduce a new strain into the “taxonomic blood stream.” In northern Mexico and Arizona the

name *lechusa* (Latin-American spelling) is applied to the Barn Owl in distinction from the eared owls that are called *tecolote*. I have therefore chosen a generic name from the Spanish instead of the Greek. The specific name is proposed in honor of my long known friend and colleague in Paleontology, Dr. R. A. Stirton.

SUMMARY

Additional information is presented regarding several Pliocene species of water birds. Generic re-assignment of one species is suggested. A new genus and species of Barn Owl is described.

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